

Editorials

How to Account for CO₂ Emissions from Biomass in an LCA

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In a part of the LCA community, a special convention has been established according to which CO₂ emissions need not be counted if emitted by biomass. For example, many studies on waste incineration do not take into account CO₂ from biomass within the incinerated waste, arguing that the creation of biomass has removed as much CO₂ as is emitted during its combustion. The logic of such a practice would imply absurd conclusions, e.g. that the CO₂ emitted by burning a tropical forest, if not counted, would equalize the climate impact of burning a forest and preserving it, which is obviously wrong. Likewise, the benefit of adding carbon capture and sequestration (CCS) to a biomass fueled power plant would not be evaluated because that CO₂ is totally omitted from the analysis.

To avoid such conclusions, we recommend that emission and removal of CO₂ be counted explicitly at each stage of the life cycle. For example, in a study of a biomass fuel chain (where biomass is grown as fuel to be burned in a power plant), the removal of CO₂ should be counted explicitly for the biomass plantation, and the emission of CO₂ explicitly for the power plant. The net effect is of course zero or almost zero in this case: the biomass has been produced only to provide fuel for the power plant. But for an LCA of waste treatment, the appropriate system boundary is at the point where the waste has been produced, since it has been produced regardless of the chosen treatment method. Thus the CO₂ emitted during incineration has to be counted fully. If CCS is included in these examples, such explicit accounting automatically yields the appropriate results, whereas the above-mentioned convention would wrongly assume that removal and emission are balanced.

Explicit accounting for CO₂ at each stage offers a further advantage, namely it allows the dynamic modeling of emission and removal. The time dimension is crucial for systems with a long delay between removal and emission of CO₂, for example, the use of wood for buildings, furniture and wood-based materials. Such CO₂ is sequestered for decades or centuries, but eventually much or all of it will be re-emitted to the atmosphere. Different processes for the re-emission may have very different time scales. It is not appropriate to neglect such delays, even if one does not use monetary valuation and discounting in quantifying the damage costs associated with climate change.

By explicitly counting CO₂ at each stage, the analysis is consistent with the 'polluter pays' principle and the Kyoto rules which imply that each greenhouse gas contribution (positive or negative) should be allocated to the causing agent. For example,

under a system of greenhouse gas taxation, the CO₂ from using wood for space heating should be taxed the same way as CO₂ from oil heating, and a credit for CO₂ removal should be paid only when and where the wood is replaced by new growth.

A selection of interesting aspects on CO₂ in general, published in *Int J LCA* in the period of 1996 through 2007 (see also this issue, pp. 282–307), is cited below [1,3–10,13–15]. The conference report [12] deals with the topic of this editorial (see also [2,11]).

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